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ABSTRACT

The booklet discusses designing barrier free nature areas to allow accessibility for handicapped persons. Among the aspects covered are site accessibility (including parking, loading and unloading areas, and directional information); walkways (including gradients, ramps, stops and curbs, width, surface material, and mechanical guides); rest areas (including benches, retaining walls, raised planters, and plant materials); communication (including signs and braille); stimulating the senses; and selecting plant materials which will appeal to the different senses (a list of such plants is provided). A brief list of suggested activities is also provided, along with suggested references. (DLS)

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DESIGNING BARRIER-FREE NATURE AREAS

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INSTRUCTIONAL MATERIALS SERVICE
3 STONE HALL • CORNELL UNIVERSITY

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PREFACE

Establishing a nature area on the school grounds or in the community is an excellent project for vocational agriculture programs. This type of project gives students experience in the areas of design, planning, construction, and planting.

Designing a nature area should include consideration of the needs and safety of physically handicapped persons. On the whole, society must become more sensitive to design and physical barriers that exclude the physically handicapped.

This manual tries to point out some of these obstacles and gives some specific guidelines for planning a nature center or garden accessible to all members of the community.

Illustrations in this text represent methods currently in use.

* * * * * * * * *

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INTRODUCTION

A public garden or nature trail should be designed and constructed so all members of the community can enjoy it. But because of design barriers many of these areas are not accessible to the physically handicapped population. The solution is not to set aside 'special' gardens and trails for the handicapped since this can promote stereotypes. For example, a "Fragrance Garden for the Blind" suggests that the only way a blind person can enjoy a garden is by the sense of smell. Other senses are also stimulated, such as hearing, touching and tasting. Labeling a nature area as "Braille Trail" potentially excludes individuals without the handicap and thus serves to isolate the handicapped individual from the rest of the community. The American Foundation for the Blind supports these sentiments, as noted in the following policy statement:

> The Foundation strongly approves of services, activities, and benefits which recognize the special needs of blind or visually-impaired persons, but disapproves of any such activity which perpetuates misconceptions and stereotyped thinking and tends to set blind persons apart from the rest of the community. It is believed, therefore, that such facilities and experiences should be available to all persons in the community including visually-impaired persons and not set aside or designated for the enjoyment of one special group. This does not, however, eliminate the desirability of tours through public facilities which could also be designed to meet the needs of special groups.

People visit gardens and nature areas for several reasons, to enjoy the beauty of plant materials, to learn about plants and nature, and for recreation. Blind and sighted, handicapped and non-handicapped people go to nature centers and gardens for these same reasons. Therefore, neglecting the handicapped population or creating separate areas seems objectionable and unnecessary.

In increasing numbers, nature areas are being established that are accessible to both the handicapped and non-handicapped individual. The ideas used by designers of these modern nature areas are effective and simple. This booklet illustrates some of these ideas and lists considerations to be made when planning areas that can be used safely by the physically handicapped.

SITE ACCESSIBILITY

The nature area should be accessible by public transportation, easy to reach, and well marked. Ample, convenient parking should be available for those who travel in personal automobiles or on bicycles. Visitors must be able to move easily and safely from their vehicles to the nature area's entrance. Careful planning will insure a safe area with easy access.

Parking

There are four basic ways to arrange parking spaces: 90°, 60°, 45°, and parallel parking. Determining which way is best will depend upon the area available and its size and shape. For each arrangement the considerations are the same for marking spaces and for providing for the needs of wheelchair-bound persons.

1. Standard parking spaces are nine feet wide. Their length depends on the arrangement - 24 feet long for parallel parking, 20 feet long for angled parking.

2. Parking spaces for the handicapped must be larger to provide room for maneuvering wheelchairs. Spaces should be 12.5 feet wide. Their length depends on the arrangement - 24 feet long for parallel parking, and 20 feet long for angled parking.

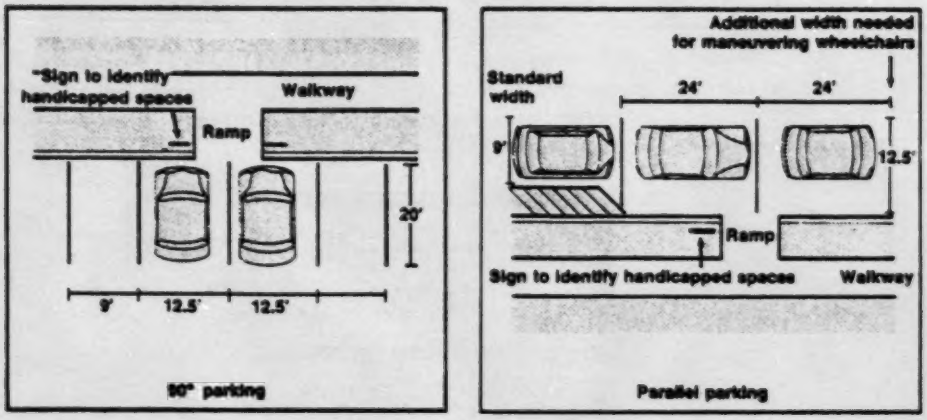
3. The parking lot should be level or have a cross-slope no greater than 5%. In sloped parking lots doors swing open more suddenly and can cause greater damage than in a level area. It is also harder for most people to travel along a sloped area.

4. Parking spaces for the handicapped should be no further than 150 feet from the entrance to the nature area.

5. Signs should clearly identify the parking spaces to be used only by handicapped persons.

The international sign of access indicates facilities designed to accommodate physically disabled persons.

6. Curbs are barriers to those in wheelchairs or with walking disabilities. Place ramps over the curb or curb cut from the designated handicapped parking area to the walkway.



Two examples of parking areas

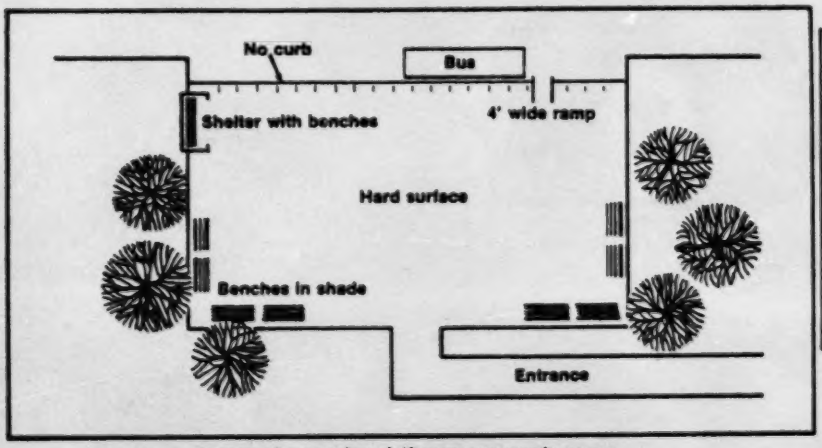
Loading and Unloading Areas

An area should be located close to the nature area's entrance for loading and unloading passengers, including those with walking aids. The areas must include plenty of space for several vehicles to safely park while unloading passengers and space for passengers to comfortably wait for rides.

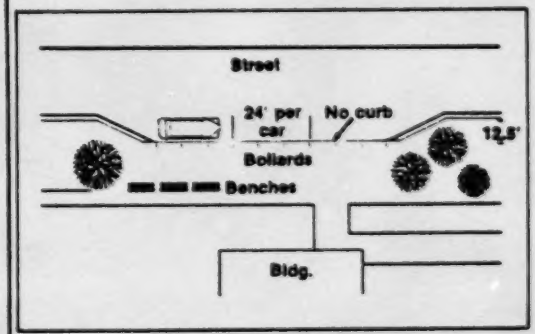
The vehicle area and waiting area should be the same grade. Separation of the two areas by bollards placed five feet apart allows for easy passage of wheelchairs and strollers.

The ideal waiting area should have some benches under trees and others under shelter, and space to accommodate about 20 wheelchairs. The waiting area should have barrier-free access to the entrance area.

Public buses usually do not carry special boarding devices to help those with restricted mobility. Transportation aids - such as elevated platforms or mechanical lifts - at the nature center's loading area would encourage wheelchair users and those with walking aids to visit.



Inexpensive wooden platforms or concrete ramps serve as welcome mats for the wheelchair-bound visitor.



A loading area that accommodates people with walking aids.

Directional Information

All access areas - parking lots, loading zones, bicycle trails, and walkways - should have signs directing the visitor to the main entrance area. Signs should be easy to read and understand. A map of the area, located at the entrance, helps orient the visitor. A tape recording giving a general introduction to the garden or area will help the visually-impaired person. Communication techniques to provide visitor information are discussed in detail starting on page 9.

A simple sign with a clear design will guide visually-impaired and full-sighted visitors.

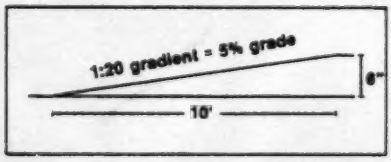
The planner must consider the topography of the site when designing nature area walkways to accommodate the physically handicapped. Steep grade changes, curbs, and sharp turns must be avoided. Constant consideration should be given to how a blind or wheelchair-bound person will get along on the walkways. Are the walkways wide enough for wheelchairs? Will the surface allow a wheelchair to move easily? How will a blind person follow the route?

The following guidelines will help the planner design a network of walkways that can be enjoyed by both the physically handicapped and non-handicapped population.

WALKWAYS

Gradients

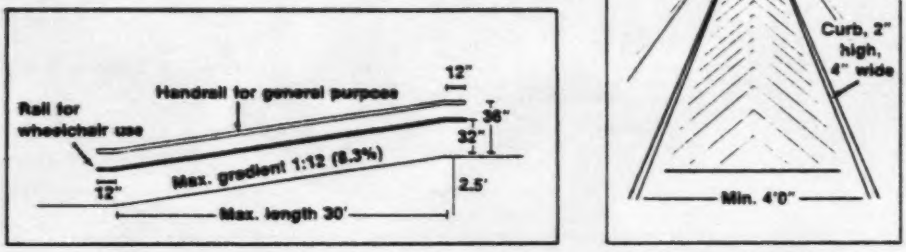
Walkway gradients should not exceed 5%. Even a 5% grade can be uncomfortable for many people if it continues for an extended distance. If a walkway must extend for several hundred feet with a grade of 4 to 5%, short level areas should be provided every 100 feet for people to stop and rest. It is better to build walkways with a grade no greater than 3% since most wheelchair users can easily move along a 3% grade.



5% grade means in about 20 feet of length the walkway rises 1 foot.

Ramps for sloped Walkways

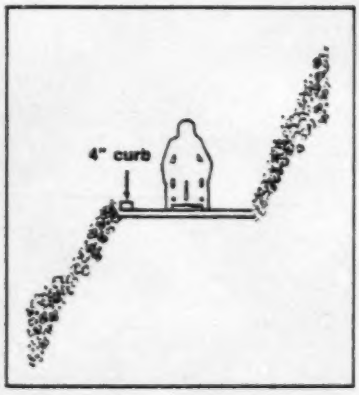
If walkway gradients exceed 5%, provide special ramps the entire distance. These ramps should be at least three feet wide, no more than 30 feet long, and have a non-slip surface and handrails on both sides. Curbs on both sides are necessary for the safety of the wheelchair-bound visitor. A change in the texture of the walkway surface at both ends of the ramp will alert the visually-impaired traveler to a gradient change.



Special ramps are needed where walkway gradients exceed 5%.

Stops and Curbs

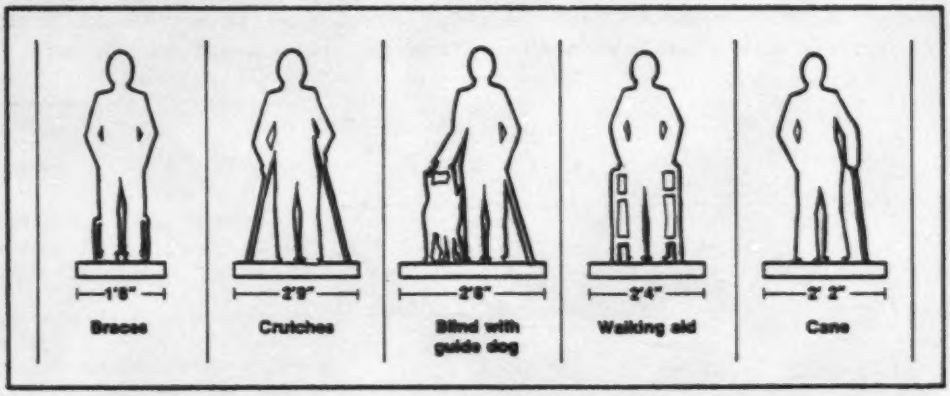
Where the walkway is not level or it is possible for a wheelchair to roll into a dangerous area, wheel stops or curbs should be built along the path's edge. Stops should be three to four inches high and six inches wide. Curbs should also be three to four inches high and long enough to protect the traveler. Concrete and wood are the most popular construction materials.



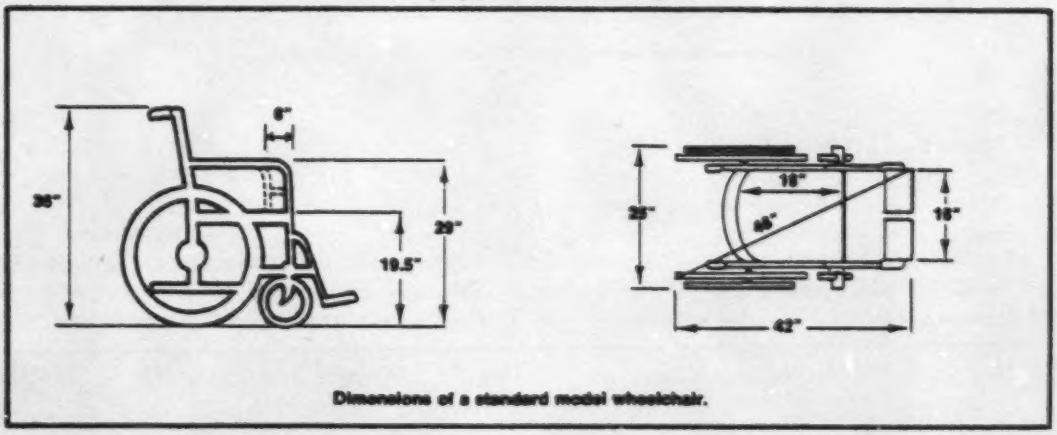
Stops and curbs are important for safety.

Width

The walkways must be wide enough to accommodate people with walking aids. Walkways with one-way traffic should be at least four feet wide and those with two-way traffic, at least six feet wide.



Width of people with various walking aids.



Dimensions of a standard model wheelchair.

Surface Materials

The choice of the walkway material is very important. The surface must be stable and firm, smooth textured, but not slippery. Avoid using expansion and contraction joints, but if they are necessary, keep them as small as possible. The joints should be filled in and no wider than one-half inch. Surface materials vary in their advantages and disadvantages, as indicated below.

SURFACE MATERIALS

Soft materials: crushed rock, earth, lawn-grass, river rock

- Irregular and soft surfaces make walking difficult for people with mobility handicaps.
- Poor surface for wheelchairs.
- Surface can erode.
- Surface cannot withstand heavy traffic.
- High maintenance requirement.
- Low installation cost.

Variable materials: cobblestone, flagstone, sand-laid brick, wood disks in sand

- Irregular surfaces and wide joints make walking difficult for people with mobility handicaps.
- Irregular surfaces make wheelchair movement difficult.
- Joints can trap the ends of crutches, canes, heels, and wheels.
- Ice and snow can damage the surface and be difficult to remove.
- Moderate maintenance requirements.
- Moderate to high installation costs.

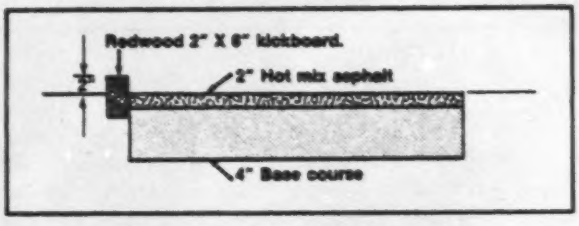
Hard surfaces: asphalt, concrete

- Firm and regular surfaces make walking with aids and wheelchair movement easy.
- Joints are minimal, less than one-half inch wide and filled.
- Ice and snow can be removed without greatly damaging the surface.
- High installation cost.
- Lowest maintenance cost.

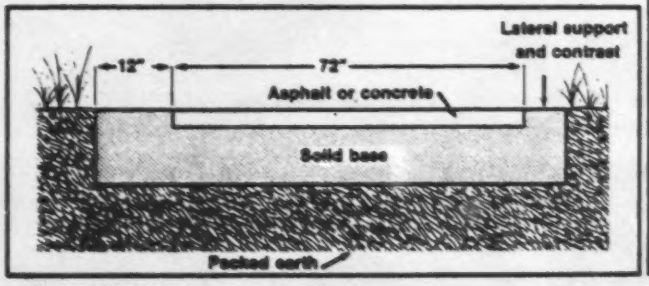
Several types of surface materials may be required. Some nature centers use a change in surface to alert visitors to a change in path direction, a change in grade, a stopping point with a message, or a rest area.

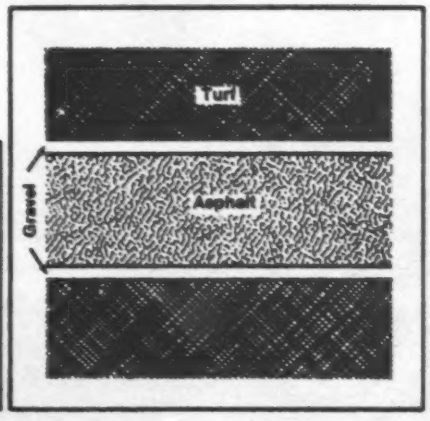
Mechanical Guides

The walkway design must include a method for guiding the visually-impaired visitor. A wooden or concrete curb along the trail's edge is one way. It can be built on alternate sides of the trail depending on the location of the interpretive sign. Another inexpensive choice is to use a material along the edge of the walkway that contrasts with the walkway surface, such as turfgrass next to asphalt. Perhaps the best method is installing a system of handrails or ropes at waist height which blends with the environment. Attach signs which identify and interpret plant materials and the natural surroundings to the handrail or rope. A dense hedge, such as yew, can also be used to direct pedestrian movement.



Walkway with kickboard for guiding the blind.





Walkway with contrasting material at its edge for guiding the blind.

REST AREAS

Many visitors, especially those with walking aids and the elderly, need to sit and rest periodically. Sitting areas - benches, low walls, and raised planters - should be provided throughout the garden and along the trails. Place these so the seated visitor has a pleasant view, is near a fragrant plant, or can hear a brook or birds. This will encourage visitors to rest and more fully experience the area.

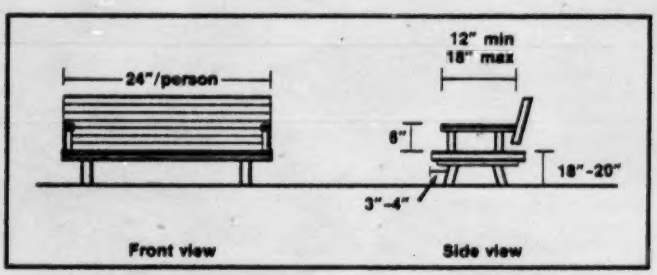
Benches

Benches should be located next to walkways, but out of the way of pedestrian and wheelchair traffic. A depth of 24 inches in front of the bench provides adequate leg room and insures free movement along the path. Leave a space of at least 36 inches next to a bench for a wheelchair to stop. As in the loading area, some benches should be in the shade.

A safe rest area with pleasant surroundings.

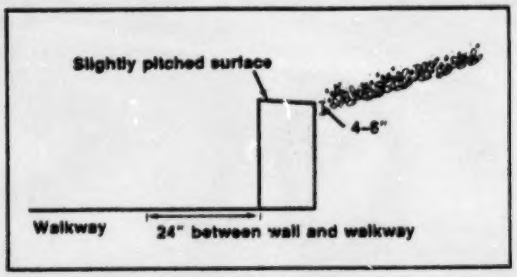
Bench surface material should not be rough or subject to splintering. The material should not readily retain heat or cold. (Wood is a good material since it stays at a moderate temperature.) Use light colored surfaces in sunny spots since they are usually cooler than dark colored or shiny surfaces.

Bench length depends on the desired seating capacity for the site. Designers plan for 24 inches per person. The bench seat should be 12 to 18 inches wide and 18 to 20 inches high. (Any lower makes it too difficult to sit down or get up from the seat.) Seats with back rests and arm supports are more comfortable and are easier to get up from. Arm rests should be six to eight inches above the seat.



Benches should be designed for comfort and easy to sit on and get up from.

Retaining walls can be built as a place to sit, to rest packages on, and to support or guide the physically handicapped individual. To build a retaining wall for one of these purposes, pitch the top toward the planting bed. The wall should be four to six inches above the plant bed surface at the interface to prevent water and soil from washing away. Provide a 24 inch leg space in front of the wall so seated people do not block traffic.

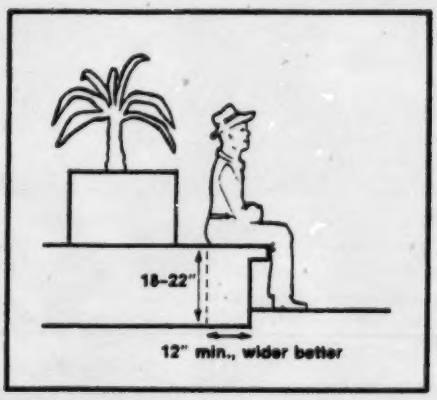


A wall built for resting and/or guiding.

Low retaining walls intended for resting should be 24 to 28 inches high and at least 12 inches wide. Retaining walls higher than 36 inches are uncomfortable for sitting, but can be used for resting packages on and as a guide for the blind. High retaining walls should be no more than 40 inches high so the wheelchair-bound individual can view the plant materials.

Raised Planters

The primary function of planters is to bring plant materials closer to eye level. But they can also be used as seats. For sitting, the planter should be 18 to 22 inches high and 12 to 18 inches wide on the top. A four inch overhang will provide heel space below, making sitting more comfortable.



Raised planters can provide a place to sit.

Plant Materials

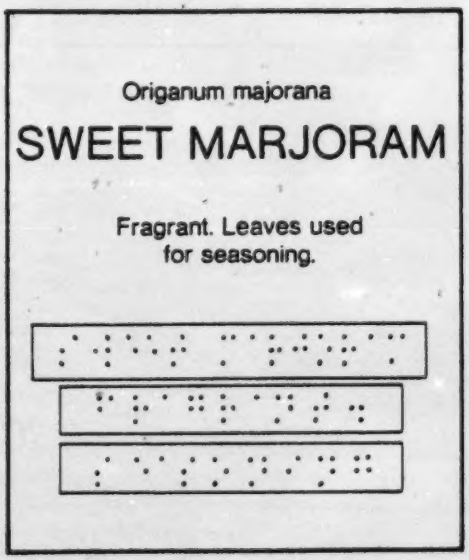
Plant materials for rest areas should be carefully selected and maintained. Use plants which are not invasive and do not drop branches, fruit, and other debris. The plant lists in the last section of this manual will help the planner make good selections.

COMMUNICATION

From the moment of arrival, the visitor will begin looking for directions and information about the nature area. All parking areas and loading zones should direct the visitor to the nature area's entrance. At the entrance, the visitor must be oriented to the grounds: site layout, meaning of any codes, rules, special features, location of rest areas, and trail length. Signs are the least expensive method of communicating this information. Careful consideration should be given to their design and placement.

Design and Lettering

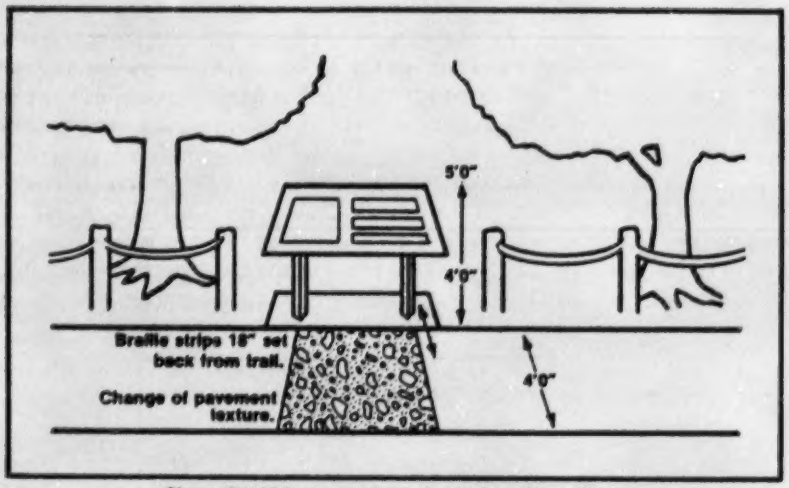
The message on signs should be presented in a clear, easy-to-read manner. To serve the visually-impaired person, lettering should be at least two inches high and of a color that contrasts with the background. Braille signs for the blind visitor should be available. Prepared metal braille strips can be placed at the edge or corner of every sign. Another idea is to set round-headed tacks through raised dots on a typed Braille message. After removing the card, the tacks remain permanently as the Braille message. Use routed or raised lettering on informational signs for blind persons who cannot read Braille.



The Braille message should always be located at the same spot on the sign.

Placement of Signs

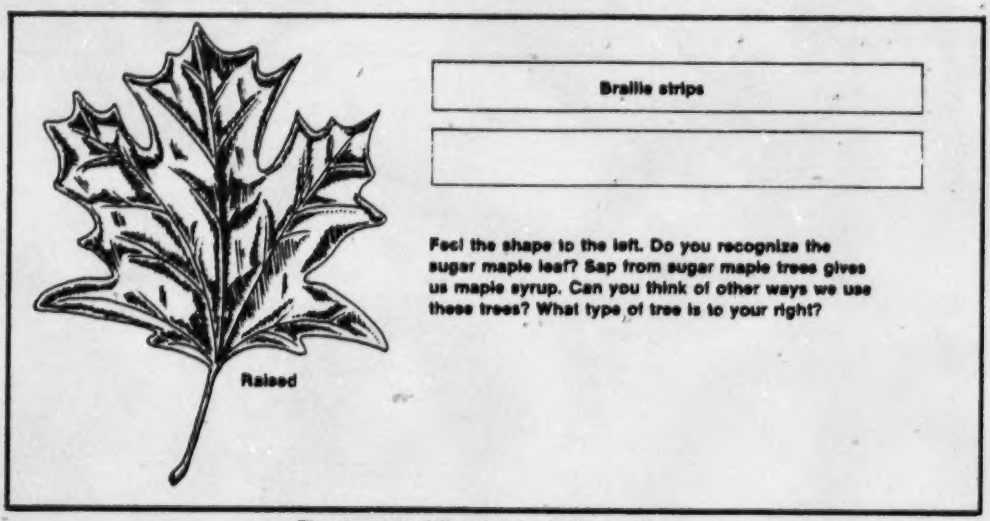
Signs must never be an obstacle or danger for any visitor. Place them at least 18 inches off the walkway and at a height of four to five feet. Sign placement should be consistent throughout the entire garden or trail. A basic pattern will help the blind individual know whether signs are always to the left or the right and if a change in walkway surface material indicates the presence of a sign. (This information should be given at the entrance area.)



Signs should be conveniently located, easily read, and consistently identified.

Involving Visitors

Signs should present facts on plant and animal identification, historic sites, ecology, and agricultural practices. They also should involve the visitor by asking questions and directing her/him to feel tree bark, smell a flower, or listen for a bird call. These activities help educate visitors by stimulating their senses and minds.


Braille strips
Feel the shape to the left. Do you recognize the sugar maple leaf? Sap from sugar maple trees gives us maple syrup. Can you think of other ways we use these trees? What type of tree is to your right?
Raised

The sign gets visitors involved with the site.

Alternatives to Signs

There are two disadvantages to communication with signs. Some nature centers report continual vandalism to their signs, requiring repeated replacement at a high cost. Secondly, a relatively low percentage of blind people in this country read Braille, and there are different Braille languages. To overcome these two disadvantages, some nature areas offer recorded messages. There are several ways to do this.

One way is to provide the visitor with a small tape recorder with a tape and an earphone. At marked spots, the recording gives directions, interesting information, and descriptions of the surroundings. Some places have installed taped messages that play at key sites when a button is pressed. (This can be annoying to other visitors in the area.) Another way is for visitors to wear headphones that pick up recorded information from underground cables. This method, probably the most desirable, is the most expensive one. (If an audio communication system is used, printed copies of the messages should be available for the deaf visitor.)

A visitor listening to pre-recorded messages from a buried radio broadcast system.

STIMULATING THE SENSES

A nature area that appeals to all five senses - sight, sound, touch, taste, and smell - pleases all visitors. Features satisfying all of these senses should be included in the design of every garden or nature trail.

For the Sense of Hearing

The sound of water - waterfalls, creeks, and ponds - is cooling and relaxing. Birdbaths attract wildlife, adding unique sounds to the area. Variation in walkway material produces contrasting tones.

For the Sense of Sight

Large mass plantings of brightly colored flowers please everyone, especially people who are partially sighted. A path that winds through areas of contrasting vegetation - dense shade to exposed areas - also stimulate vision.

For the Sense of Touch

It is interesting and fun to touch plant materials. Nature areas should include plants with different textures. Construct raised beds (at least two feet high) to help those in wheelchairs reach low-growing plants. Every visitor benefits from touching some plants; however, these plants should be hardy enough to withstand the handling or their periodic replacement must be planned.

For the Sense of Smell

Plant herbs and plants with fragrant flowers at the edge of walkways and in raised beds. The twigs of some trees have strong odors when broken. If their debris is not a nuisance, plant some of these trees near rest areas and walkways.

For the Sense of Taste

Include some edible plants to satisfy the visitors' taste buds. Plants offering a range of edible parts - fruits, leaves, stems, flowers - should be included. If plant tasting is encouraged, no poisonous plants should be planted in the area.

SELECTING PLANT MATERIALS

Selecting plant materials is an important step in the design process. Plants are primarily chosen for their aesthetic value, but consideration must be given to whether the plants have hazardous qualities. This list names plant characteristics that could create problems in a nature area.

1. Vertical clearance: To prevent eye or face injuries, a minimum clearance of eight feet must be maintained over walkways. Trees with branches that tend to droop below the minimum, such as birch and willow trees, must be planted away from walkways.

2. Root systems: Trees with shallow root systems tend to heave and break up walkways, creating hazardous conditions for pedestrians. Willow, red maple, silver maple, Norway maple, beech, cottonwood, and poplar have shallow roots. They should be planted away from paths, pipelines, cables and sewers.

3. Poisonous plants: Plants with poisonous parts should be avoided or planted only in locations inaccessible to the visitor. The brightly-colored fruits or leaves of holly, yew, privet, laurel, and rhododendron may tempt people to taste them, resulting in illness.

4. Thorns: Thorns are painful to brush against. Fallen branches with thorns can injure the traveler in sandals or light shoes. Plants with thorns, such as barberry, quince, hawthorn, locust, holly, and rose, should be used with discretion and always away from the walkway.

5. Debris: Plants that drop a lot of debris or break easily from heavy snow or wind can be a hindrance to the visitor and the nature area's maintenance crew. Crab apple, plum, cherry, oak, hickory, horse chestnut, and catalpa, drop pods, berries, cones, and nuts which are slippery to walk on, are easily tracked into buildings, and can stain clothes. Fallen cones from pines, spruce, fir, larch, and hemlock are obstacles to the traveler, especially the wheelchair-bound person. Seed pods from sweet gum, sycamore, honey locust, and maple cause similar problems. Falling branches from weak-wooded trees such as birch, silver maple, box elder, horse chestnut, poplar, and Washington thron litter the walkway and damage plants below them.

6. Odor: Siebold viburnum, female gikgo and blackhaw produce an undesirable odor that may detract from the aesthetic appeal of of area.

7. Insect susceptibility: Fruit trees that are heavily attacked by insects and pests, such as crab apple, cherry, and plum, should not be placed next to walkways or rest areas.

8. Blockage of light: Mass plantings of trees can be used for protection from sun and wind; however, the plants must not be placed where they could block articifical lighting at night or sunlight needed during the winter for melting ice and snow.

9. Ground covers and vines: These plants must be well maintained and planted away from walkways, steps, ramps, signs, and light fixtures.

As discussed in the previous section, plant materials which appeal to different senses should be included in every nature area. This list suggests some plants hardy to Central New York State and particularly desirable for a nature area.

Botanical Name	Common Name
Fragrant shrubs and trees:	
Calycanthus floridus	sweet shrub, Carolina allspice, pineapple shrub, strawberry shrub
Daphne cneorum	rose daphne, garland flower
Elaegnus commutata	silverberry
Lindera benzoin	spicebush
Lonicera fragrantissima	fragrant honeysuckle
Magnolia soulangiana	saucer magnolia, Chinese magnolia
Philadelphus coronarius	mock orange
Prunus serrulata	Japanese flowering cherry
Syringa vulgaris	common lilac
Viburnum Carlesii	Korean spice viburnum
Viburnum Farreri	fragrant viburnum
Tilia cordata	small-leaved European linden
Tilia tomentosa	silver linden
Sassafras albidum	common sassafras
Plants for texture:	
Centaurea Cineraria	dusty-miller
Cotinus Coggyria	smokebush
Petroselinum crispum	parsley
Salix caprea	goat willow, pussy willow, florist's willow, sallow
Stachys byzantia	lamb's ears

HERBS

Botanical Name	Common Name	Description
Allium Schoenoprasum	chive, cive, schnittlauch	Scent of onions, purple flowers for mass color
Angelica Archangelica	angelica, archangel, wild parsnip	Stems and leaves small like sweet celery or gin
Artemisia Absinthium	common wormwood, absinthe	Texture is soft and hairy, musty fragrance
Asperula ordorata	sweet woodruff, woodruff, woodroof	Fragrance of hay
Foeniculum vulgare	fennel	Scented like anise
Lavandula officinalis	lavender	Leaves and flowers have a pleasant fragrance
Melissa offinalis	lemon, common, bee and sweet balm	Leaves have fragrance of lemon
Mentha piperata	peppermint	Leaves smell like mint
Mentha spicata	spearmint	Leaves have sweet fragrance of mint
Ocimum Basilicum	common basil, sweet basil	Fresh or dried leaves have strong basil odor
Origanum vulgare	wild marjoram, marjoram, pot marjoram, origano, organy	Smell of leaves is pungent
Pelargonium crispum	lemon geranium	Leaves have a scent of lemon
Pelargonium graveolens	rose geranium, sweet-scented geranium	Leaves are softly hairy and rose fragranced
Pelargonium tomentosum	peppermint and herb-scented geranium	Leaves very soft to touch, peppermint scented
Rosmarinus officinalis	rosemary	Fresh and dried leaves have a spicy smell
Salvia officinalis	garden sage, common sage	Fresh and dried leaves have a strong fragrance
Santolina chamaecyparisss	lavender cotton	Leaves have a pungent odor; foliage lacy, silvery
Tanacetum vulgare	common tansy, golden buttons	Leaf texture is fine; leaf scent is pungent
Thymus vulgaris	common thyme, garden thyme	Fragrance of leaves is spicy and pungent

Botanical Name	Common Name
Plants for mass color:	
Acer saccharum	sugar, rock and hard maple
Euonymus alata	winged spindle tree
Forsythia intermedia	showy border forsythia
Forsythia suspensa	dropping forsythia
Kerria japonica	kerria, Japanese rose
*Rhodcdenron spp**	azalea, rhododendron
Narcissus spp.	daffodil
Tulipa spp.	tulip
Plants with edible fruits and seeds:	
Amelanchier laevis	serviceberry
Fragaria virginiana	Virginia strawberry
Gaultheria procumbens	wintergreen, checkerberry, teaberry, ivry-leaves, mountain tea
Impatiens capensis	jewelweed, spotted touch-me-not, lady's earrings
Mitchella repens	running box, twinberry, squawberry, squaw vince, partridgeberry, two-eyed berry
Prunus avium	sweet cherry, gean, mazzard, bird cherry
Vitis rotundifolia	muscadine, bullace, and southern fox grape, scuppernog, bullace
Plants whose fruits attract birds:	
Cornus florida	flowering dogwood tree
Cornus racemosa	panicled dogwood shrub
Juniperus virginiana	red cedar
Malus spp.	apple tree
Pyrus Malus	pear tree
Rhus radicans	poison ivy, poison oak, mercury, markry, cowitch
Rhus typhina	Virginian sumac, staghorn sumac, velvet sumac
Viburnum acerifolium	arrowwood, dockmakie, possom haw, maple-leaved variety

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spp. = species (plural)

SUMMARY

It is a challenge for any designer to plan a nature area that can accommodate the physically handicapped. All aspects of a plan must be critically reviewed for any barriers. In general, the designer must consider the following:

1. Site accessibility: parking, loading and unloading areas, directional information
2. Walkways: gradients, safety features, width, surface material, guides
3. Rest areas: location of structures for sitting, plant materials
4. Communication: media (signs, texts, tapes), design, placement
5. Stimulation of all five senses: hearing, sight, touch, smell, taste
6. Selection of plant materials: aesthetic value, function, convenience, safety

It is hoped that the guidelines presented in this text will make the designer's task easier and will promote the establishment of nature areas that serve the whole community.

SUGGESTED ACTIVITIES

1. Visit gardens and trails and evaluate them according to considerations listed in this booklet.
2. Redesign existing gardens and nature trails and present the new design to those places.
3. Establish on a small scale a trail or garden at your school.
4. Meet with physically handicapped people to discuss how they feel about these guidelines and efforts to make gardens and trails more accessible to them.

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